DOCUMENT RESUME

ED 373 881 PS 022 556

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TITLE A Case for Quality Preschool Programs.
PUB DATE [94]
NOTE 45p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Academic Achievement; Achievement Tests; *Disadvan[illegible], Early Childhood Education; Kindergarten; *Kindergarten Children; Models; Preschool Curriculum; *Preschool Education
IDENTIFIERS *Perry Preschool Project

ABSTRACT

Following a review of the model compensatory education program resulting from the Perry Preschool Project in Ypsilanti, Michigan, this paper describes a study undertaken to test the efficacy of the Perry model as implemented in a preschool program run by the San Francisco Unified School District. The Perry Preschool Project, initiated in 1962, found that an intensive, child-centered curriculum could boost the academic performance and school success of disadvantaged children. The Perry model was used by the 21st Century Academy with an experimental group of 9 kindergarten students from February through June 1993. Fourteen kindergartners participated in a control group that received a standard kindergarten curriculum over the same period. Most of the students were African-Americans from disadvantaged backgrounds. Pre- and posttest results indicated that students exposed to the Perry model curriculum had significantly higher achievement test scores than students exposed to the traditional kindergarten curriculum. (MDM)

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A Case for Quality Preschool Programs

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Abstract

Evidence from the model compensatory program provided by the Perry Preschool Project, Ypsilanti, Michigan is reviewed in detail to provide a model, local quality preschool programs can follow, in order to duplicate the demonstrated successes of the project: immediate increased aptitude test scores for kindergarten students who attended the project program with projected long term benefits in education, economic and life success measures, demonstrated over a 15 year period. A local quality preschool program instituted by the San Francisco Unified School District, with an inner city preschool student population, who followed the model Perry Preschool Project's curriculum and theory, was tested to discover whether comparable statistically significant improvement in student aptitude test scores would take place the following year, when entering kindergarten students were tested. Kindergarten aptitude test scores of local students composed of an experimental and a control group were analyzed. A statistically significant difference between the scores of students with quality preschool program experience (experimentals) and those without (controls) was found.

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Chapter 1. The Research Problem

Introduction

During the week of March 1st, 1994, the California Legislature gave overwhelming approval to the most stringent of five different "Three Strikes You're Out" measures, all designed to put third-time felons away for 25 years to life. To demonstrate his devotion to the tough-on-crime sentiment popularly ruling his state, Governor Pete Wilson demanded that the Legislature send him the toughest bill, one which will apply stiff penalties not just to violent and serious third felonies but also to milder third offenses like burglary and petty theft (Waters, 1994).

The current climate of "Three Strikes You're Out" policy is being touted as citizen outcry to get tough on the epidemic of rising community crime. Adding to this, the crippling social problems of unemployment, welfare dependency, school drop outs, teen pregnancies, and the shortage of skilled workers to nationally compete in global markets gives a picture of dire social concerns threatening the very fabric of our society.

Research Problem

Couple the high costs these social ills bring with economic conditions of Federal Government deficit spending and public concern over its constantly soaring increases; and it is clear that social research pointing towards avenues to alleviate these problems is very valuable.

Background

On the community level, this list of social and economic problems grows out of a background of poverty, and poverty is growing at an alarming rate in our cities. Public abandonment of inner cities and their complicated problems is reflected in the drop of Federal funding grants to cities from 11.5% in 1980 to 3.8% in 1990 (Wilkins, 1994).

The population most rapidly sinking into growing conditions of poverty are children; the nation's most vulnerable population and its most precious resource. As Federal grants to cities decline, the percentage of children in poverty rises. In 1989, 22% (4.8 million) of American children under 6 years of age lived in poverty (Weikart, 1989) compared to 15% (3.3 million) in 1969 (U.S. Bureau of Census, 1969). Of these current 4.8 million children, 14% (672,000) have teenage mothers, 10% (480,000) have poorly educated, possibly illiterate parents, while predictive statistics indicate that of the children who even stay in school until high school, 25% (1.2 million) of these disadvantaged students will not graduate (Weikart, 1989). In 1991, the figures for children under 6 years of age who have moved into poverty continued to increase to 5.781 million, 25% of all children under 6 (U.S. Bureau of Census, 1992).

These statistics are for American children in general. For minority youngsters, the data become much more grim. An

Afro-American child is three times more likely to be born in poverty than a White child. An Hispanic child is twice as likely to be poor. The 1993 statistics for the Afro-American population reflect that 50% of Afro-American children live in poverty (4.375 million), 3.5 million of these children are under the age six, and 60% (2.625 million) are born to single mothers. Thirty-three percent (10.242 million) of the total Afro-American population lives below the poverty level compared to 11% (23.747 million) of the White population (U.S. Bureau of Census, 1993). Murder is the leading cause of death for young Afro-American males age 15 to 24.

These statistics for poor children are in stark contrast to the American ideal of equal opportunity for all, and as stated, are extremely aggravated for the minority child. A shift of city population has taken place since 1965, coincident with declining Federal funding. Ethnic minorities who used to make up one eighth of city populations in 1965, now in 1994 constitute a third (Williams, 1994).

Wilkins, in a recent article entitled "Free at Last?" (1994) comments: "It is both odd and sad that 40 years after the Supreme Court of the United States ruled in Brown versus Board of Education, Afro-Americans are facing their greatest peril since slavery: socioeconomic devastation that effect 40% (12.41 million) of them" (p. 27).

The picture that emerges is an inner city with a minority

population of one-third, impoverished by a national policy of fund reductions, ravaged by the social ills of unemployment, welfare dependency, school drop-outs, teen pregnancy whose final outcomes are all too often violence and crime. And now, to these steps of degenerated social development is added the possibility of life imprisonment with "Three Strikes You're Out" as a legislated solution.

Purpose of Study

What does social science research have to contribute as far as alternative solutions to such crucial social problems? Traditionally, education has been a way out of poverty, ignorance and their associated social ills (Weikart, 1989). There is a broad section of research literature on the economic benefits of educational success. Among these are research studies that have shown educational interventions which produced long term social improvement results (Barnett, 1990). More specifically, research into the benefits of compensatory preschool education of disadvantaged students is pointing the way that educational success can lead to improvement in economic well being and social adjustment.

More than 100 studies provide some information about the effects of compensatory preschool education on disadvantaged children. Most estimate each program's immediate effect on IQ scores by using the mean IQ scores of the experimental and

control groups as the comparative measure.

These data have been efficiently summarized by meta-analyses that average effect sizes (in standard deviation units) across studies. Casto and Mastropieri (1986) have done this for the literature as a whole and McKey and her colleagues (1985) have done this for Head Start studies (Barnett, 1990). Both find an average effect on IQ of about 0.5 standard deviations (8 IQ points). The meta-analyses also find that the effects of IQ fade out over time in nearly every study. The failure to find permanent effects on IQ is the source of claims that preschool education has failed to help disadvantaged children.

Foundation

The problem that has been encountered repeatedly in the analysis of the effects of compensatory preschool education for disadvantaged children is the reliance on IQ scores as the significant measure. All of the studies of researcher initiated programs find initial IQ gains for the experimental group by the end of the preschool program followed by a decline in this advantage over time.

No study reports differences in IQ scores that persist beyond grade school. The initial gain of experimentals over the comparison groups ranges from 5 to 13 IQ points, with the largest gains for preschool programs that provide the child with 2 years of enrichment experience (Barnett, 1990).

Research Question

A much smaller number of researcher-initiated studies have investigated effects on variables other than IQ and provide evidence that preschool programs can produce persistent effects on academic success despite the erosion of IQ effects (Barnett, 1990). The basis for this explanation is that IQ measures only part of cognitive abilities. A list of these studies is found in Table 1 below.

Table 1

Researcher-Initiated Compensatory Preschool Studies

Project Name	Initial N's Exp.,Contol
Perry Preschool	58, 65
Early Training	44, 21
Institute for Developmental Studies	312, 191
Philadelphia	60, 53
Harlem Training	244, 68
Curriculum Comparison	116, 24
Experimental Variation	214, 34
Howard University	38, 69

(Barnett, 1990).

These researches specifically argue that preschool education increases abilities in ways that are not satisfactorily measured by IQ tests. Many psychologists would argue that there is much more to intelligence than IQ. Some hold that there are multiple intelligences and that IQ tests measure only one type of intelligence. Eysenck's (1982) study on intelligence includes the concept that what IQ tests measure may be conceptualized as the speed of error-free information processing.

Significance

Researcher initiated studies look at variables the researchers have identified to express cumulative school success: reduction in grade retention, decrease in special education placement, and high school graduation. In addition to school success, researchers also included variables they identified to express life success measures: such as reduction of teen pregnancy, delinquency, crime, welfare dependence and unemployment (Haskins, 1990).

Implications

When considering the compensatory preschool program, its definition is important. A phase that has been adopted in the literature, to distinguish compensatory preschool programs from day-care, is quality preschool programs. The term preschool is precise, as opposed to prekindergarten, because research points to the influence this set of educational practices has all

throughout the school experience, well into young adulthood.

Quality preschool programs are distinguished from other programs by their dedicated purpose to provide children with the knowledge and social competencies needed for normal development and success in further public school experiences (Weikart, 1989).

The age of children who participated in these studies depended on the length of the preschool program. For those programs lasting a year, the children would start at approximately 4 years of age. Two year programs would consist of children who started at approximately 3 years old.

Summary

Haskins (1989), who surveyed evidence from these researcher-initiated quality preschool programs, concluded:

> .... taken as a group, these are remarkable studies. They demonstrate unequivocally that quality preschool programs can provide an immediate boost to children's intellectual performance and reduce their rate in special education classes. The studies also point to positive effects decreasing grade retention and increasing the rate of high school graduation (p. 276).

Chapter 2. Research Literature Review

Introduction

Weikart (1989) has identified the Perry Preschool Project as a standard point of reference for those who argue in favor of compensatory preschool education. Its acceptance is widespread. The American Psychological Association has selected it as one of 12 validated methods of reducing social problems of adolescence (Price (Ed.), 1988). This endorsement occurred after a committee of scientists carefully reviewed research from 900 intervention programs. After reviewing the economic studies of the Perry Preschool Project, the Committee on Economic Development called quality preschool education a major investment opportunity for the business community (Hechinger (Ed), 1986).

The Perry Preschool Project

Weikart (1967) reported that The Perry Preschool Project offers evidence that preschool educational effects lead to improvement in economic well being and the social adjustment of inner city youth. The Perry Preschool Project began in 1962 in Ypsilanti, Michigan. The goal of the project was to learn if a preschool education program could improve the school success of children in a low-income Afro-American community who historically did not fare well in the school system. The project was designed as a classical experiment in which children were randomly assigned to an experimental preschool group or a

control group. The project was Federally funded and directed by David Weikart (1967, 1989) who later continued the follow-up study through the High/Scope Education Research Foundation.

There were 123 participants in the researcher designed project that were handled in five waves due to limitations on the number of children who could be served in the preschool each year. Subjects were recruited for low rating in the socioeconomic scale based on parental occupation, education, and housing crowdedness. IQ tests were individually administered as preprogram measures if parents agreed to participate. Children scoring 1 standard deviation below the mean or more and showing no signs of organic causations for mental retardation or physical handicap were eligible for the study. The children were then ranked on IQ scores and matched pairs were formed by adjacent children. One number of each pair was randomly assigned to form two groups. Since samples were too small to rely on chance to produce comparable groups, pair members were switched to equate groups on sex and socioeconomic status. One group was randomly designated the experimental group.

Treatment

The experimental group attended a 2 1/2 hour a day program 5 days a week from October to May. In addition to this, a teacher made a home visit to each family once a week in the afternoon to provide about 1 1/2 hours of home education for the

child. There was extensive direction, planning, discussion, inservice training, and program development activity. Curriculum was, however, constantly evolving.

The Perry Preschool Project used what has since been called the High/Scope Curriculum whose fundamental premise is that children are active learners and construct their own knowledge from activities they themselves plan and carry out. Active learning on the children's part affected everything in the curriculum, from teacher training to parent involvement. Such an approach implies a consistent daily routine so that the children can follow up on their plan and ideas. Routine taught children control of their time, which helps them develop a sense of responsibility and independence. Adults did not lead work time activities but aided the children to set up their own problem solving situations. Teachers helped set up a model plan, do, review cycle (Weikart, 1989) that children learned to follow. Based on Piaget's (1963) theory of cognitive development, curriculum was organized around key experiences for the child in the development of rational thought. Key experiences also created a frame of reference that helped teachers assess a child's progress in the program. (go to disc)

Assessment

During the preschool years, a large number of tests of cognitive abilities were administered by trained examiners who

were blind to group assignment and sensitive to issues of creating a comfortable situation for the child and obtaining an accurate measure of ability. Project administered IQ and achievement tests continued through elementary school years and were given again at age 15. Collection and coding of records were conducted by staff who were uninformed about group membership and were not otherwise involved in the research.

Findings

Attritition was minor, about 5% over a 16 year period. Table 2 presents findings over the years that are indicative of the major effects the preschool program. Estimated effects on IQ are entirely consistent with those of other studies. It appears that the preschool group's IQ fell at the same time that the IQ scores of the control group were boosted by kindergarten experience. As time passed, the preschool group's IQ continued to fall, and by age 8, there was no IQ difference between treatment and control groups.

Table 2

Selected Findings of the Perry Preschool Project

Outcome	Treatment Group (N)	Control Group (N)	p
Intelligence Test Scores			
At study entry	79.6 (58)	78.5 (65)	–
After 1 year	95.5 (58)	83.3 (65)	.001
Age 6	91.3 (56)	86.3 (64)	.024
Age 7	91.7 (58)	87.1 (61)	.040
Age 8	88.1 (55)	86.9 (62)	–
Age 9	87.7 (56)	86.8 (61)	–
Age 10	85.0 (57)	84.6 (57)	–
Age 14	81.0 (54)	80.7 (56)	–
Achievement Test Scores			
Age 7	97.1 (53)	84.4 (60)	.216
Age 8	142.6 (49)	126.5 (56)	.079
Age 9	172.8 (54)	145.5 (55)	.042
Age 10	225.5 (49)	199.3 (46)	.040
Age 14	122.2 (49)	94.5 (46)	.003
Age 19	24.6 (52)	21.8 (57)	.059

(Barnett, 1990, p.298).

A different pattern was found for achievement test scores. At the same time the preschool group lost its IQ advantage, it appears to have gained an advantage on achievement test scores. By age 14, this advantage was quite strong: the preschool group was ahead by 1.2 grade equivalents on language performance and math. At age 19, the preschool group scored significantly higher also on Adult Performance Level, an achievement test designed to measure the skills and knowledge needed for educational and occupational success in five content areas (community resources, occupational knowledge, consumer economics, health, government and law) and five skills areas (knowledge of facts and terms, reading, writing, computation and problem solving).

The findings of persistent advantages on standardized tests of achievement in the Perry Preschool Project is especially important because it is the only study with reasonable sample size when compared with the other eight researcher-inititated studies in Table 1. It is plausible that the absence of persistent effect in other studies is an artifact of flawed design for test data collection. Specifically, other studies have higher grade retention, special education placement, or both in the control group, but systematically exclude these low performers in collecting achievement test data.

The data collected on preschooling indicated that the

preschool program had statistically significant cumulative effects on school success more broadly defined by reduction of grade retentions and assignment to special education classes, and upon follow-up, to increase the preschool populations rate of graduation from high school.

Table 3 summarizes these findings.

Table 3

Selected Findings of the Perry Preschool Project

Outcome	Treatment Group (N)	Control Group (N)	
School Success (to age 19)			
Yrs. spent in special ed.	16% (54)	28% (58)	.004
Classified mentally retarded	15% (54)	35% (58)	<.05
Graduated high school	67% (58)	49% (63)	<.05
Post secondary ed.	38% (58)	21% (63)	<.05
Economic Success (at age 19)			
Employed	50% (58)	32% (63)	<.05
Median earnings	$3,860 (58)	$1,490 (63)	.061
Self-supporting	45% (58)	25% (62)	<.05
Welfare recipient	18% (58)	32% (63)	<.05
Social Adjustment (to age 19)			
Arrested	31% (58)	51% (63)	.021
Average number of arrests	1.3 (58)	2.3 (63)	.001
Av. number teen pregnancies	.7 (25)	1.2 (24)	.076

(Barnett, 1990, p. 298).

This pattern suggests that preschool educational effects are related to cognitive performance rather than a general

improvement in attitude. A higher percentage of the preschool group enrolled in some type of post-secondary education or training program.

In addition, long term effects of preschool education were not limited to effects on education alone, as shown by findings summarized in Table 3 under "economic success" showing measures of employment versus welfare dependency and "social adjustment" measured in arrest rates and number of teen pregnancies. At age 19, the preschool group reported a higher employment rate and higher earnings. While the positive effects on employment, earnings, and decrease of arrests and welfare dependency might have been predicted from educational effect (reviewed by Haveman & Wolfe, 1984), it is reassuring to have direct estimates.

Having established that there were substantive long term effects, the next step in the Perry Preschool Project was to try to weigh the economic benefits of those effects against the costs. The findings of long term educational, economic and social effects has been called "something of a mystery" (Gramlich, 1986). The explanation favored by the results of the Perry Preschool Project is the view that preschool education primarily increases cognitive abilities in ways that are not satisfactorily measured by IQ tests.

Summary

The Perry Preschool Project includes the most complete cost-benefit analysis of early childhood education yet undertaken (Weikart, 1989).

> The cost-benefit analysis of the Perry Preschool Project, covering fifteen years of follow-up data, indicates that this type of program can be a good investment for taxpayers. The major cost (in constant 1981 dollars, discounted at 3% annually) is the initial invest of about $5,000 per participant per program year (p. 11).

The total benefits to taxpayers amount to about $28,000 per participant, which is nearly six times the initial cost of the one year program. The savings on special education alone are equivalent to the cost of a one year program (Weikart, 1989).

The Perry Preschool Project offers evidence that quality preschool programs' educational effects lead to improvements in economic well being and social adjustment. Even though compensatory preschool education apparently produces long term benefits without permanently increasing IQ, it is argued that is does permanently improve cognitive abilities as measured by achievement tests.

Even if public programs were all as successful as the Perry Preschool program, compensatory preschool education would not be a total solution. Compensatory preschool programs can have

meaningful effects and still not eliminate the long term disadvantages associated with being born in poverty. Early childhood education and care will not completely solve the social ills of unemployment, welfare dependency, school drop-outs, teen pregnancy, crime, and violence that are tearing our cities apart, while spreading to the outlying population in general. It does, however, offer an alternate, classically humanistic approach to these problems opposed to the "gulag" approach of the "Three Strikes Your Out" policy of current popular interest.

Chapter 3. Methodology

Introduction

The Perry Preschool Project experimental design and findings were used as a model by which to test the validity of a quality preschool program that was instituted at the 21st Century Academy, a model academic elementary school program of the San Francisco Unified School District, located in the Bayview Hunters Point section of the city.

The school was brought into existence in January of 1993 by means of a Consent Decree issued by the U.S. District Court of San Francisco in 1982. The Consent Decree was issued by the court as a judgment against the San Francisco Unified School District (SFUSD) for maintaining a segregated school system which was the result of a 1978 lawsuit brought by the NAACP. With the court decree, a mandate established that SFUSD would

achieve the broadest practical distribution of racial and ethnic groups throughout the school system and provide programs of academic excellence for all students. Special provisions were made for designated schools to be developed under special plan. The Special Plan for Bayview Hunters Point Schools, drafted in May 1993 by the Department of Integration SFUSD, established the 21st Century Academy elementary school. This model school program was designed to utilize a coherent combination of successful educational interventions in order to provide a rich curriculum to stimulate academic excellence and achievement in a targeted at risk student population.

The Bayview-Hunters Point district of San Francisco is noted for its concentration of Afro-American students in an inner city atmosphere who traditionally have not fared well in the San Francisco school system. There was also a significant Hispanic student population that was targeted to be served by this model school program.

As a result of the social science research provided by the Perry Preschool Project and like studies, the foundation of the new model school program was established on the quality preschool program. The initiating principal and his team of collaborators had to fight hard to have this program included because, at the time, SFUSD was being threatened with the loss of its preschool license by California state due to non-compliance with state regulations.

Because of a district wide political climate where those who were losing programs due to administrative problems and funding cuts, looked jealously on the creation of a new quality preschool program, it was necessary to quickly and simply establish the validity of the program that was being used.

The Perry Preschool Project experimental design and findings provided an excellent model to follow in order to establish the quality preschool program validity needed by the 21st Century Academy. While the Perry Preschool Project followed a classical experimental design, it was necessary for the 21st Century Academy to use a quasi-experimental design as the experiment was taking place in the field of an ongoing educational program.

The Perry Preschool Project experiment found persistent advantages on standardized achievement test scores for students who had attended the quality preschool program compared to students who had not experienced such educational enrichment. It was the purpose of the 21st Century Academy quasi-experimental design to establish that kindergarten students who had attended the quality preschool program at the academy would demonstrate statistically higher aptitude test scores than kindergarten students at the academy who had not experience the quality preschool program.

Research Design

Following the classical experimental model of the Perry Preschool Project, a quasi-experimental design was used to test the validity of the quality preschool program of the 21st Century Academy. As this was a field test, the experimental controls that were used in the classical experimental design were not available. Specifically, the random assignment of students to either experimental or control group was replaced by the available data assignment of students to either group according to whether or not they had been exposed to the independent variable of quality preschool program experience.

Treatment

The treatment, then in this research design, was the administration of the independent variable, a quality preschool program experience, presented spring semester 1993 from February 3rd to June 17th, for approximately 4 1/2 months duration. The program consisted of 4 hours a day, 5 days per week. The dependent variable to be measured for effect by the treatment, in this after-only experimental design, was designated as an aptitude test score for each student obtained during the fall semester kindergarten attendance, 1993.

Like the Perry Preschool Project curriculum, that of the 21st Century Academy quality preschool program was based on the fundamental premise that children are active learners and

construct their own knowledge from activities they themselves plan and carry out. The guiding theoretical model and practice materials used, were based on the Montessori method in which the teacher had been trained rather than the High/Scope Curriculum used in the Perry Preschool project. But similar to the Perry Preschool project, there was extensive direction, planning, discussion, inservice training, and program development activity in this brand new quality preschool program. Curriculum was constantly evolving.

Sampling Procedure

Those kindergarten students who had attended the quality preschool program at the 21st Century Academy, spring semester 1993, prior to entry into one of the kindergarten classes in the fall of 1993, were assigned to the experimental group. Those kindergarten students who had not attended the quality preschool at the academy during spring of 1993 were assigned to the control group.

Sample Description

Subjects for the experiment were selected from two of the kindergarten classes in attendance at the 21st Century Academy, fall of 1993, and consisted of those students who had taken the aptitude test administered by the teacher or the paraprofessional teaching assistant assigned to each class.

Assignment to experimental or control group was made

on the basis of whether or not the student had experienced the experimental treatment of attending the quality preschool program of the academy during spring semester 1993.

Because the number of available subjects for this study were extremely limited and to insure that none of the available data from the aptitude test scores was lost, a matched group design was used. The experimental and control groups were matched to each other as a group according to demographic data of age, ethnic classification breakdown, low socio-economic level and residential area location to insure equivalent comparison groups.

By definition, students attending either kindergarten class had to be at least 4 years, 9 months at the beginning of fall semester 1993. As in the Perry Preschool Project, the 21st Century Academy program was designed to serve the targeted student population of inner city youth, characterized as educationally disadvantaged due to the low socio-ecinomic group their parents belonged to. Confirmation of parents low socio-economic rating was obtained through income applications filed for students' free lunch service.

This student population was targeted for a preschool educational enrichment program due to the educational disadvantages inherent in the inner city environment of poverty. The Special Plan for Bayview Hunters Point Schools (Department

of Integration SFUSD, 1993) identified this district as such an environment. Kindergarten student subjects all resided in this targeted district. As in the model Perry Preschool Project, the goal of the 21st Century Academy quality preschool program was to learn if such a program could improve school success of children in a low-income Afro-American community who historically did not fare well in the school system. The targeted population included Hispanic students and other ethnic groups who lived in the Bayview-Hunters Point district as well.

Table 4 shows ethnic classification breakdown for the matched group subjects. Both the experimental and control groups contain students with the following ethnic classifications: Afro-American, Hispanic, and Other Non-White. There is the exception of one White student contained in the control group while the experimental group does not have a student of that ethnic classification. Because the available data was limited, and the groups were adequately matched on the other demographic criteria: age, low socio-economic rating, and inner city residential location; the researcher determined to keep this subject.

Table 4

21st Century Academy Ethnic Classification Breakdown by Subject

Subject # Exper. Group	Ethnic Classification	Subject # Control Group	Ethnic Classification
#1	Hispanic	#1	Afro-American
#2	Afro-American	#2	Afro-American
#3	Afro-American	#3	White
#4	Afro-American	#4	Afro-American
#5	Afro-American	#5	Afro-American
#6	Afro-American	#6	Hispanic
#7	Other Non-White	#7	Hispanic
#8	Afro-American	#8	Other Non-White
#9	Afro-American	#9	Afro-American
		#10	Afro-American
		#11	Afro-American
		#12	Afro-American
		#13	Hispanic
		#14	Other Non-White

Instrumentation

The aptitude test instrument used to measure the experimental and control groups of kindergarten students was the BRIGANCE® K & 1 Screen (Brigance, 1987). It was administered individually to all kindergarten students attending fall semester, 1993, by the kindergarten teacher or the paraprofessional assistant assigned to the class. This test is described as a criterion-referenced screening assessment and was selected by the professional educators at 21st Century Academy involved in establishing valid testing procedures.

Criterion-referenced refers to the fact that the skills used in the screening instrument were selected for specific educational criteria and included the following: (1) skills which a review of research literature support as having the greatest predictive validity for student success in kindergarten and first grade, (2) skills that can be assessed expediently with a high degree of validity and objectivity, (3) skills that personnel using the BRIGANCE® Inventory of Basic Skills (Birth - 7 Years) (Brigance, 1982) and BRIGANCE® Diagnostic Inventory of Basic Skills (K - 6) (Brigance, 1982) found to be most appropriate for screening purposes, and (4) skills that field testing and critiquing have indicated as the most valid and appropriate for screening purposes.

The following justifications and features of the BRIGANCE®

K & 1 Screen (Brigance, 1987) describe this particular assessment tool. Screening can be accomplished quickly. The basic screening of most students can be completed within 10 to 12 minutes. This is very attractive with kindergarten students whose attention span is often limited. Screening a student who responds slowly rarely takes more than 20 minutes. Screening provides an overall picture of the student 's development in key areas, such as language, motor ability, number skills, body awareness, and auditory and visual discrimination. Data can be summarized on one page and thus a glance across the pupil data sheet provides a quick review. The basic assessments for each level are such that they will allow for a high degree of success for most students. An added feature of the assessment is that correlated forms are included for assessor's observations, teacher's rating, and parent's rating for optional use. Also, the criterion and curriculum referencing of the assessments provide data that can be translated into instructional objectives once measurement is made.

Data Collection Procedures

Aptitude test scores were collected at the beginning of the 1993 fall semester by the kindergarten teacher or paraprofessional assistant administering the BRIGANCE® K & 1 Screen individually to each kindergarten student.

Scores for each student were calculated for ranking and

grouping purposes. A point value was assigned to each skill in the basic screening assessment to provide a means of calculating a score for each student. This score made it possible to rank students in group assignment to either the experimental or control group. A composite score could also be calculated for each student as an ordinal scale measure.

Limitations

The chief limitation inherent in this quasi-experimental field study, using available data, was found in the severely limited number of experimental and control group subjects used for data collection and comparison. Because the quality preschool program was brand new, the only subjects that could be assigned to the experimental group were the nine students who were old enough to enter the kindergarten program in fall of 1993. This was less than one half the class that had actually attended spring semester, 1993.

Even if the entire preschool body had been available, it would have given only twenty-two subjects for the experimental group. Having an experimental group of under thirty participants necessitated using a non-parametric statistical test of significance, so that only the null hypothesis stating there was no statistical difference between aptitude test scores of the experimental and control groups could be tested.

Summary

Considering the urgency of demonstrating the value of the quality preschool program that had been prepared and delivered by the 21st Century Academy in 1993, all of the constraints inherent in the field experiment had to be worked with.

Chapter 4. Results

Introduction

Aptitude test scores were obtained for each of the nine subjects of the experimental group and ranked from low to high as were the scores of the fourteen subjects of the control group, found in Table 5 below.

Findings

The range of scores for the experimental group was 15 and the mean aptitude test score was 93.1 with a standard deviation of 4.8. The control group had a range of 21 and a mean of 75.9 with a standard deviation of 7.3. Sample variance measures for the experimental group was 23.17 while that of the controls was 52.9. Finding that the experimental group had almost one half the sample variance measure of the control group, may indicate a tendency toward homogeneity in the experimental group brought on by their quality preschool program experiences.

Comparison of the mean scores of each group, 93.1 for experimentals and 75.9 for controls certainly is in line with the findings of persistent advantages on standardized tests of

achievement found for Perry Preschool program participants.

Table 5

Aptitude Test Scores of Experiment and Control Groups

Outcome	Experimental Group (n = 9)	Control Group (n = 14)
Aptitude Test Scores		
Subject 1	85	63
Subject 2	88	65
Subject 3	92	69
Subject 4	92	70
Subject 5	93	73
Subject 6	94	73
Subject 7	94.5	75
Subject 8	99.5	78
Subject 9	100	80
Subject 10		83
Subject 11		83
Subject 12		83
Subject 13		84
Subject 14		84

(Goldstein Software, 1991).

Hypothesis of Difference

Based on the findings of the Perry Preschool Project that was used as a research model for the validity testing of the 21st Century Academy's quality preschool program, it was hypothesized that a difference would be found in aptitude test scores between experimental and control group subjects.

Because of the small number of sample subjects and the use of ordinal data, the aptitude test results for both groups were analyzed by the nonparamentric Mann-Whitney *U* test. The null hypothesis (H_0), there are no differences between the experimental and control groups aptitude test scores was tested, with the results appearing below in Table 6.

Table 6

Mann-Whitney *U* Test Analysis Results

	Levels of significance		
Outcome	.05	.01	.001
z statistic	-3.94	-3.94	-3.94
Critical value	31.38	21.61	10.26
Null hypothesis	reject	reject	reject

Reject H_0: significant at $P < .001$ (Goldstein Software, 1991).

Summary

The conclusion of this study is to reject the null hypothesis that the two sets of ranks for experimental and control groups represent a single population. The data from the sample show a significant difference in aptitude test scores between experimental and control groups. Therefore, the alternative hypothesis that the two sets of ranked scores represent different apptitude test populations, is accepted.

Chapter 5. Discussion, Conclusions & Recommendations

Introduction

It can be seen by comparing the differences in aptitude test scores between the 21st Century Academy's experimental and control group subjects in Table 5, page 35 with those reported in Table 2, page 18 of the Perry Preschool Projects aptitude test results, that the differences in the two sets of scores follows a consistent pattern.

The quality preschool program offered students produced consistent statistically significant improvement in aptitude test scores for both studies.

Discussion of Findings

At the outset of this research question, prompted by the dire community patterns of increased crime and violence, especially in the inner cities, it was asked whether social science research may contribute alternative solutions to these problems,

rather than the "gulag" approach of increased prison policy that is currently being favored.

Traditionally, education has been a way out of poverty, ignorance and the associated social ills of crime and violence (Weikart, 1989). The next question that was asked was whether there were any educational interventions in the social research literature that would point the way to an alternate solution.

It was found that research into the benefits of compensatory preschool education by the Perry Preschool Project provided a standard point of reference that demonstrated over a 15 year period of study and follow-up that a quality preschool program could produce long term benefits in improved outcomes educationally, economically, and socially for the students involved.

Detailed reporting and analysis of the Perry Preschool Project was conducted in this research report with the intention that it be a model by which to examine the validity of a local compensatory preschool program intervention for disadvantaged inner city children of San Francisco.

The inductive logic the design of this study proposed was, if the compensatory preschool program being offered at the 21st Century Academy could be shown to be a valid quality preschool program that produced statistically significant improvement in aptitude test scores, then it could be inferred that there was a strong possibility that the other long term benefits associated with

such improvement would follow.

It was found that the 21st Century Academy's quality preschool program did produce statistically significant improvement in aptitude test scores for student participants, with an increase of 17.2 points out of 100 in the mean scores of the experimental group over the control, an improvement rate of 17.2%.

This difference, with its inferred associated benefits, was produced by a short program of only 360 hours of instruction over a 4 1/2 month period of time and is comparable to the effects found in the Perry Preschool Project with 400 hours on instruction over an 8 month period. This is a remarkable result and points to a hopeful alternate intervention for aggravated social problems.

Statistical analysis via the Mann Whitney *U* test results allows the research study to have the confidence that the changes in the dependent variable of aptitude test scores was caused by the independent variable of quality preschool experience

Recommendations for Further Research

Because of the limits inherent in the quasi-experimental field study approach of this research with its extremely limited sample of subjects, it could be considered in the nature of a pilot study. The motivation for conducting the study, as stated on page 25 of this report, was brought on by political and fiscal funding pressure to prove the validity of the new program. And that initial

goal has been completed.

To consolidate the findings, time is needed for further research. The quality preschool program can only accomodate twenty-two students, because of licensng restrictions. It would take at least another year to accumulate thirty subjects who had quality preschool program experience at the academy and the group would have to be handled in waves, as the Perry Preschool Project did, to assemble such an experimental group. The program would also have to last that period of time within the current of political and fiscal pressures. This quality preschool program is the only one that is in existence in the San Francisco public school district at this time.

Summary

From the achievement test score increases experienced by kindergarten students at the 21st Century Academy who had attended a quality preschool program, the conclusion is being drawn that this educationally enriched background is a stimulus that will increase cognitive development throughout the early life of the student and promote life success patterns that will help offset the detrimental conditions of an impoverished social environment.

It is remarkable, as Haskins (1989) observed in his survey, that an investment of as little as 360 hours of a quality preschool program in a 4 year olds life can produce long term cognitive

development gains, economic and social success results of measurable improvement in employment, earnings, and decreases in arrests and welfare dependency (Haveman & Wolfe, 1984) (Weikart, 1989).

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